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THE following communications were read:—

I. Mr. Baily's paper, "on Lacaille's Catalogue of 398 principal Stars," was concluded.

In this paper Mr. Baily has entered into the merits of this celebrated catalogue. The method adopted by Lacaille for determining the right ascensions was that known by the name of *equal altitudes*: for when he commenced his astronomical career, the transit instrument was but little known, and not fully appreciated; and although it had been introduced into the observatory by Roëmer, yet it was soon abandoned for the mural quadrant, which at that time was considered a more manageable and accurate instrument, and capable of giving at one view both the right ascensions and the declinations. The instrument used for this purpose was a 3-feet quadrant: and he usually took about 14 or 16 altitudes on each side of the meridian. The culmination of the stars being thus determined, he compared them with α *Lyræ* or *Sirius* (whose absolute right ascension had been ascertained by frequent comparisons with the sun), and thus computed their right ascensions relatively to those stars. The declinations were determined with two different instruments: one a 6-feet sector, and the other a 6-feet sextant; the divisions of which were examined with great care by himself, and the trifling discrepancies noted and allowed for.

By the help of these instruments, Lacaille determined the positions of nearly 400 of the principal stars in the northern and southern hemisphere: and the catalogue which he thus produced, and which is the subject of the present memoir, is worthy of being placed in competition with those of his distinguished contemporaries. Mr. Baily has examined this catalogue with great care, and has discovered a few errors, which seem to have escaped the diligence of its illustrious author.

When Lacaille had finished his observations and his catalogue, he was at a loss for the means of publishing them; since his own limited income would not warrant the expense. He tried several modes of doing this, and at last agreed with his bookseller to compute for him an astronomical ephemeris for ten years, if he would print a sufficient number of copies for distribution amongst his scientific friends and correspondents. Such was the origin and cause of the *Fundamenta Astronomiæ*,—a work which was not

published for sale, and which can therefore only be obtained accidentally from time to time as it occasionally passes from the hands of those to whom it was originally presented. It is consequently very rare; and those who possess it ought (as M. Delambre emphatically expresses it) to preserve it as a precious relic.

As the catalogue has never yet been reprinted, in the extended and perfect form in which it exists in that work, Mr. Baily conceived that he should be rendering an acceptable service to astronomers in presenting it to them, thus corrected, through the medium of this Society, accompanied with a comparison of the places of all the stars visible in this latitude, with those given by Bradley; and a reference to every observation of every star; together with notes accompanying the whole. Mr. Baily has also mentioned another motive which induced him to examine the comparative merits of this catalogue at the present time: since above one-third of the stars are so situated that they cannot be observed in this latitude, on account of their great southern declination. These stars, therefore, he justly remarks, will afford a favourable opportunity of comparison with the same stars as observed by Sir Thomas Brisbane at his observatory at Paramatta; whose valuable and extensive observations are now in the course of reduction at the public expense; and thus enable us to determine, with considerable precision, the annual variation of at least 136 principal stars in the southern hemisphere. Mr. Baily closes his paper with a few remarks on the scientific life of Lacaille.

II. A letter from Mr. Dawes, dated April 23, 1831, of which the following are extracts: —

"I beg to call the attention of the Astronomical Society to an interesting circumstance respecting the triple star ζ Cancri. I am not aware of any published observations relative to the positions of the stars composing it, since those of Sir James South, made at Passy in 1825. Possibly, however, such may exist, and may render my present communication unnecessary, or, at any rate, less interesting.

"The evenings of the 19th and 20th of this month proving favourable for delicate observations, I directed a five-feet achromatic telescope to this object. This instrument was constructed for me last year by Mr. Dollond; and from the perfectly round, clean, and very small discs with which it exhibits the fixed stars, it is peculiarly adapted for the examination of very close and delicate objects. It is mounted equatorially, with horary and declination circles, each of two feet diameter, and is furnished with a position and parallel-thread micrometer, possessing a variety of magnifying powers, from 55 to 625. The instrument was fitted up with a special view to the examination of the positions and distances of the multiple stars. Each part of the micrometer screw-heads is equal to 0″,5559219."

Mean result. Pos. of AB = 59° 13′ *nf* (16 obs.) Dist. = 1″,095 (7 obs.)
Pos. of AC = 60 17 *sf* (5 obs.) Dist. = 5 ,592 (5 obs.)

After giving the observations, Mr. Dawes proceeds thus: —

" Now, if we compare these results with the measurements of Sir W. Herschel in 1781, and of Sir James South in 1825, a very extraordinary variation appears. In 1781·90, Sir W. Herschel's measure of the position of AB was 86° 32′ *nf.* In 1825·27, a mean of 43 measures (the means of the *six* different sets on as many nights, agreeing admirably together) gave as the position 32° 10′ *nf*, offering a difference of 54° 22′ from the position in 1781. *Now*, however, the angle lies as nearly as possible midway between the two, being 27° 19′ less than that of 1781, and 27° 3′ greater than that of 1825; while the distance, as measured by me, is only 0″,009 greater than the result of 15 observations by Sir J. South. It would therefore appear as if the motion had been performed in a *direct* sense (or *nf sp*) for perhaps thirty or forty years; and that the star B had then come to a stand, (or *appeared* to do so), faced about, and is now proceeding in the *opposite* direction, which is the same pursued by the star C. But this is an extravagant idea; and unless there exist observations in the intervening period to invalidate the supposition, I think we may arrive at a solution of the difficulty in a more simple manner; namely, that in the forty-nine years elapsed since Sir W. Herschel's measurement, the star B has performed *almost an entire revolution*, in a retrograde sense, or *np sf*, only about 27° or 28° being wanting to complete it.

" Mr. Herschel, in his notes appended to Sir J. South's valuable paper, forming the first part of the *Philosophical Transactions* for 1826, has mentioned an observation of this star by his father in 1802, ' at which time,' it is said, ' no measures could be procured.' Now, supposing this to be the only observation recorded during the interval, it may be asked, Would not Sir W. Herschel have been struck with any remarkable alteration in the relative positions of A and B, even supposing the circumstances were not such as to admit of measurements? To this it may be replied, that it is highly probable the star B would, about the year 1802, have arrived at that point of its orbit in which it would be nearly *opposite* to its place in 1781; and the stars differing but little in size, it might not be noticed, especially in unfavourable circumstances, which *preceded;* and, consequently, it might easily be imagined to have sustained but little, if any, alteration.

" The position of B now observed is the more remarkable, because, had it pursued the course formerly assigned, its angle relative to A would now be about 24° or 25° *nf.* That an error of 35°, or any thing like it, should be committed in my measurements, appears quite improbable; since, if we examine them, we shall find that the extreme difference of all the sixteen measures taken on the two evenings is only 3° 35′. And I may here observe, that in measuring both positions and distances, I always *derange* the former measurement so completely, that the situation of the wire could not by possibility be taken for a measure. Thus, each individual measure is not a previous one, altered and amended, but is entirely new and independent.

" It will be seen that the above observations corroborate the

presumed motion of the star C in *direction*, and indicate a considerable acceleration in it since 1825, compared with the *mean* velocity during the previous forty-two years; while the distance continues very nearly the same as it was at that date. Compared with Sir J. South's observations, the change of angle amounts to 7° 38′ in six years, or 1°,267 per annum; while, previously, the mean motion was supposed to be only 0°,5813. But in the observations appended to the measures by Messrs. Herschel and South, in 1822, we were forewarned to expect an acceleration, *if the motion were orbitual*. My observations of the star C, however, being made on one night only, may be liable to an error of one or two degrees, especially as the position of the star B, and its extreme proximity to A, render the measures of C difficult."

III. An Index to the Society's Catalogue, by Lieut. W. S. Stratford, R.N.; so arranged that the number of any star contained in the Catalogue may be found immediately, provided there be given the name of the constellation, and the letter by which the star is distinguished, or the number of the star in one of the following catalogues; viz. Flamsteed's, Piazzi's, Bradley's, Lacaille's, Fallows's, Zach's, &c., preference being given to each catalogue in the order of succession.

IV. A paper containing micrometrical measurements of 364 double stars, by J. F. W. Herschel, Esq.

The abstract of this paper, the reading of which is not yet completed, will appear in the next Monthly Notice.

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